Related Occupations
Bricklayers and stonemasons combine a thorough knowledge of brick, concrete block, stone, and marble with manual skill to erect attractive, yet highly durable, structures. Workers in other occupations with similar skills include cement masons, concrete finishers, plasterers, terrazzo workers, and tilesetters.

Sources of Additional Information
For details about apprenticeships or other work opportunities in these trades, contact local bricklaying, stonemasonry, or marble-setting contractors; a local of the union listed above; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or the State apprenticeship agency.

For general information about the work of either bricklayers or stonemasons, contact:

☛ International Union of Bricklayers and Allied Craftsmen, International Masonry Institute Apprenticeship and Training, 815 15th St. NW., Suite 1001, Washington, DC 20005.

Information about the work of bricklayers also can be obtained from:

☛ Associated General Contractors of America, Inc., 1957 E St. NW., Washington, DC 20006.

☛ Brick Institute of America, 11490 Commerce Park Dr., Reston, VA 22091-1525.

☛ Home Builders Institute, National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005.

☛ National Concrete Masonry Association, 2302 Horse Pen Rd., Herndon, VA 22071.

Carpenters

(O*NET 87102A, 87102B, 87102D, 87102F, 87105, and 87121)

Significant Points

- Nearly one-third of carpenters—the largest construction trade in 1998—were self-employed.
- Although employment is expected to grow slowly, job opportunities should be excellent because many carpenters leave the occupation each year.
- Many builders use specialty carpentry subcontractors who do one or two work activities, so versatile carpenters able to switch specialties should have the best opportunities for steady work.

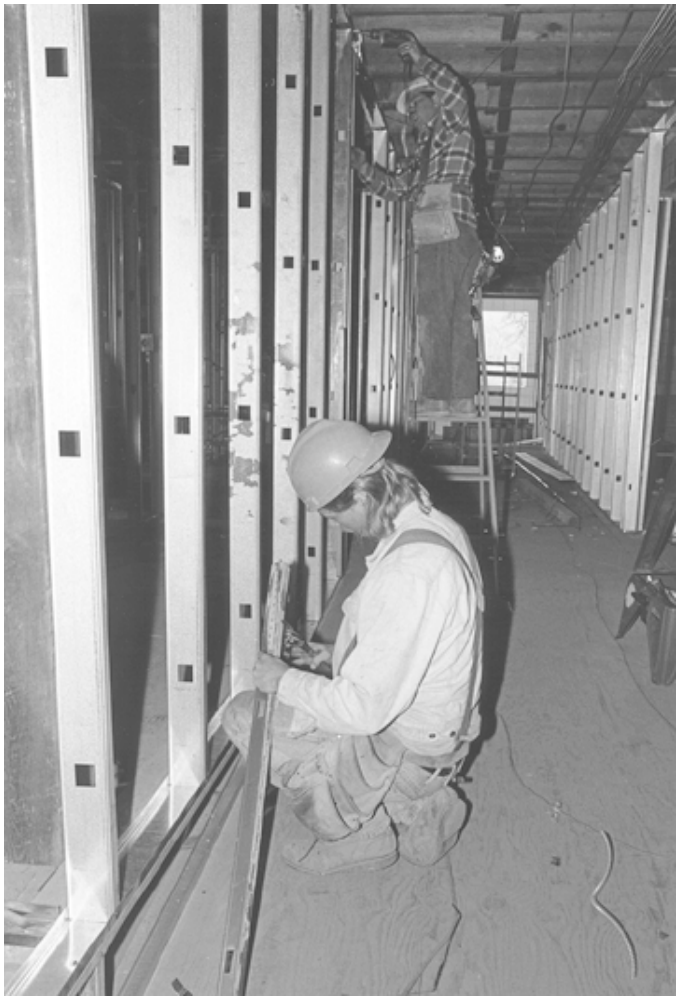
Nature of the Work
Carpenters are involved in many different kinds of construction activity. They cut, fit, and assemble wood and other materials in the construction of buildings, highways, bridges, docks, industrial plants, boats, and many other structures. Carpenters' duties vary by type of employer. Builders increasingly are using specialty trade contractors who, in turn, hire carpenters who specialize in just one or two activities. Some of these activities are setting forms for concrete construction; erecting scaffolding; or doing finishing work, such as installing interior and exterior trim. However, a carpenter directly employed by a general building contractor often must perform a variety of the tasks associated with new construction, such as framing walls and partitions, putting in doors and windows, building stairs, laying hardwood floors, and hanging kitchen cabinets.

Because local building codes often dictate where certain materials can be used, carpenters must know these requirements. Each carpentry task is somewhat different, but most involve the same basic steps. Working from blueprints or instructions from supervisors, carpenters first do the layout—measuring, marking, and arranging materials. They cut and shape wood, plastic, fiberglass, or drywall, using hand and power tools, such as chisels, planes, saws, drills, and sanders. They then join the materials with nails, screws, staples, or adhesives. In the final step, carpenters check the accuracy of their work with levels, rules, plumb bobs, and framing squares and make any necessary adjustments. When working with prefabricated components, such as stairs or wall panels, the carpenter's task is somewhat simpler than above, because it does not require as much layout work or the cutting and assembly of as many pieces. Prefabricated components are designed for easy and fast installation and generally can be installed in a single operation.

Carpenters who remodel homes and other structures must be able to do all aspects of a job—and not just one task. Thus, individuals with good basic overall training are at a distinct advantage, because they can switch from residential building to commercial construction or remodeling work, depending on which offers the best work opportunities.

Carpenters employed outside the construction industry perform a variety of installation and maintenance work. They may replace panes of glass, ceiling tiles, and doors, as well as repair desks, cabinets, and other furniture. Depending on the employer, carpenters install partitions, doors, and windows; change locks; and repair broken furniture. In manufacturing firms, carpenters may assist in moving or installing machinery. (For more information on workers who install machinery, see the sections on industrial machinery repairers and millwrights elsewhere in the *Handbook.*)

Working Conditions
As in other building trades, carpentry work is sometimes strenuous. Prolonged standing, climbing, bending, and kneeling are often necessary. Carpenters risk injury working with sharp or rough materials, using sharp tools and power equipment, and from slips or falls. Additionally, many carpenters work outdoors, which can be uncomfortable.



Some carpenters specialize in framing walls and partitions.

Some carpenters change employers each time they finish a construction job. Others alternate between working for a contractor and working as contractors themselves on small jobs.

Employment

Carpenters, the largest group of building trades workers, held about 1.1 million jobs in 1998. Nearly 4 of every 5 worked for contractors who build, remodel, or repair buildings and other structures. Most of the remainder worked for manufacturing firms, government agencies, wholesale and retail establishments, or schools. Nearly one-third were self-employed.

Carpenters are employed throughout the country in almost every community.

Training, Other Qualifications, and Advancement

Carpenters learn their trade through on-the-job training, as well as formal training programs. Most pick up skills informally by working under the supervision of experienced workers. Many acquire skills through vocational education. Others participate in employer training programs or apprenticeships.

Most employers recommend an apprenticeship as the best way to learn carpentry. Apprenticeship programs are administered by local joint union-management committees of the United Brotherhood of Carpenters and Joiners of America, the Associated General Contractors, Inc., and the National Association of Home Builders. In addition, training programs are administered by local chapters of the Associated Builders and Contractors and by local chapters of the Associated General Contractors, Inc. These programs combine on-the-job training with related classroom instruction.

On the job, apprentices learn elementary structural design and become familiar with common carpentry jobs, such as layout, form building, rough framing, and outside and inside finishing. They also learn to use the tools, machines, equipment, and materials of the trade. Apprentices receive classroom instruction in safety, first aid, blueprint reading, freehand sketching, basic mathematics, and different carpentry techniques. Both in the classroom and on the job, they learn the relationship between carpentry and the other building trades.

Usually, apprenticeship applicants must be at least 17 years old and meet local requirements. For example, some union locals test an applicant's aptitude for carpentry. The length of the program, usually about 3 to 4 years, varies with the apprentice's skill. Because the number of apprenticeship programs is limited, however, only a small proportion of carpenters learn their trade through these programs.

Informal on-the-job training is normally less thorough than an apprenticeship. The degree of training and supervision often depends on the size of the employing firm. A small contractor specializing in home-building may only provide training in rough framing. In contrast, a large general contractor may provide training in several carpentry skills. Although specialization is becoming increasingly common, it is important to try to acquire skills in all aspects of carpentry and to have the flexibility to perform any kind of work.

A high school education is desirable, including courses in carpentry, shop, mechanical drawing, and general mathematics. Manual dexterity, eye-hand coordination, physical fitness, and a good sense of balance are important. The ability to solve arithmetic problems quickly and accurately is also helpful. Employers and apprenticeship committees generally view favorably any training and work experience obtained in the Armed Services or Job Corps.

Carpenters may advance to carpentry supervisors or general construction supervisors. Carpenters usually have greater opportunities than most other construction workers to become general construction supervisors, because carpenters are exposed to the entire construction process. Some carpenters become independent contractors. To advance, these workers should be able to estimate the nature and quantity of materials needed to properly complete a job. In addition, they must be able to estimate, with accuracy, how long a job should take to complete and its cost.

Job Outlook

Job opportunities for carpenters are expected to be plentiful through the year 2008, due primarily to extensive replacement needs. Thousands of job openings will become available each year as carpenters transfer to other occupations or leave the labor force. The total number of job openings for carpenters is usually greater than for other craft occupations, because the carpentry occupation is large and the turnover rate is high. Because there are no strict training requirements for entry, many people with limited skills take jobs as carpenters but eventually leave the occupation because they dislike the work or cannot find steady employment. However, employment of carpenters is expected to increase more slowly than the average for all occupations through the year 2008.

Increased demand for carpenters will create additional job openings. Construction activity should increase slowly, in response to demand for new housing and commercial and industrial plants and the need to renovate and modernize existing structures. Opportunities for frame carpenters should be particularly good.

However, the demand for carpenters will be offset somewhat by expected productivity gains resulting from the increasing use of prefabricated components, such as prehung doors and windows and prefabricated wall panels and stairs, which can be installed very quickly. Prefabricated walls, partitions, and stairs can be lifted into place in one operation; beams—and in some cases entire roof assemblies—can be lifted into place using a crane. As prefabricated components become more standardized, builders may use them more often. In addition, improved adhesives will reduce the time needed to join materials, and lightweight, cordless pneumatic and combustion tools—such as nailers and drills—and sanders with electronic speed controls will make carpenters more efficient.

Carpenters can experience periods of unemployment because of the short-term nature of many construction projects and the cyclical nature of the construction industry. Building activity depends on many factors—interest rates, availability of mortgage funds, government spending, and business investment—that vary with the state of the economy. During economic downturns, the number of job openings for carpenters declines. New and improved tools, equipment, techniques, and materials have vastly increased carpenter versatility. Therefore, carpenters with all-round skills will have better opportunities than those who can only do a few relatively simple, routine tasks.

Job opportunities for carpenters also vary by geographic area. Construction activity parallels the movement of people and businesses and reflects differences in local economic conditions. Therefore, the number of job opportunities and apprenticeship opportunities in a given year may vary widely from area to area.

Earnings

In 1998, median hourly earnings of carpenters were $13.82. The middle 50 percent earned between $10.84 and $18.57. The lowest 10 percent earned less than $8.74 and the highest 10 percent earned more than $23.57. Median hourly earnings in the industries employing the largest numbers of carpenters in 1997 are shown below:

Masonry, stonework, and plastering	$18.20
Nonresidential building construction	15.10
Carpentry and floor work	13.60
Residential building construction	12.40
Personnel supply services	11.40

Earnings can be reduced on occasion, because carpenters lose work time in bad weather and during recessions when jobs are unavailable.

In 1998, median hourly earnings of ceiling tile installers and acoustical carpenters were $15.27. The middle 50 percent earned between $11.88 and $20.50. The lowest 10 percent earned less than $9.68 and the highest 10 percent earned more than $29.57.

Some carpenters are members of the United Brotherhood of Carpenters and Joiners of America.

Related Occupations
Carpenters are skilled construction workers. Workers in other skilled construction occupations include bricklayers, cement masons, concrete finishers, electricians, pipefitters, plasterers, plumbers, stonemasons, and terrazzo workers.

Sources of Additional Information
For information about carpentry apprenticeships or other work opportunities in this trade, contact local carpentry contractors, locals of the union mentioned above, local joint union-contractor apprenticeship committees, or the nearest office of the State employment service or State apprenticeship agency.

For general information about carpentry, contact:

☛ Associated Builders and Contractors, 1300 North 17th St., Rosslyn, VA 22209.

☛ Associated General Contractors of America, Inc., 1957 E St. NW., Washington, DC 20006.

☛ Home Builders Institute, National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005.

☛ United Brotherhood of Carpenters and Joiners of America, 101 Constitution Ave. NW., Washington, DC 20001.

Carpet, Floor, and Tile Installers and Finishers

(O*NET 87308, 87602, 87605, and 87608)

Significant Points

- Over one-half of carpet, floor, and tile installers and finishers are self-employed.
- Working conditions are generally more pleasant than those of other construction trades, because carpet and tile and other floor coverings are installed in finished, or nearly finished, structures.
- Carpet, floor, and tile installers and finishers are less likely than other construction trades to be idled by slowdowns in construction or inclement weather.

Nature of the Work
Carpet, tile, and other types of floor coverings serve an important function in buildings, but their decorative qualities also contribute to the appeal of the buildings. Carpet, floor, and tile installers lay these floor coverings in homes, offices, hospitals, stores, restaurants, and many other types of buildings.

Before installing carpet, *carpet installers* first inspect the surface to be covered to determine its condition and, if necessary, correct any imperfections that could show through the carpet or cause the carpet to wear unevenly. They must measure the area to be carpeted and plan the layout, keeping in mind expected traffic patterns and placement of seams for best appearance and maximum wear.

When installing wall-to-wall carpet without tacks, installers first fasten a tackless strip to the floor, next to the wall. They then install the padded cushion or underlay. Next, they roll out, measure, mark, and cut the carpet, allowing for 2 to 3 inches of extra carpet for the final fitting. Using a device called a "knee kicker", they position the carpet, stretching it to fit evenly on the floor and snugly against each wall and door threshold. They then rough cut the excess carpet. Finally, using a power stretcher, they stretch the carpet, hooking it to the tackless strip to hold it in place. The installer then finishes the edges using a wall trimmer.

Because most carpet comes in 12-foot widths, wall-to-wall installations require installers to tape or sew sections together for large rooms. They join the seams by sewing them with a large needle and special thread or by using heat-taped seams—a special plastic tape made to join seams when activated with heat.

On special upholstery work, such as stairs, carpet may be held in place with staples. Also, in commercial installations, carpet is often glued directly to the floor or to padding that has been glued to the floor.

Carpet installers use handtools such as hammers, drills, staple guns, carpet knives, and rubber mallets. They also may use carpet-laying tools, such as carpet shears, knee kickers, wall trimmers, loop pile cutters, heat irons, and power stretchers.

Tile installers, or *tilesetters*, apply tile to floors, walls, and ceilings. Tile is durable, impervious to water, and easy to clean, making it a popular building material in hospitals, tunnels, lobbies of buildings, bathrooms, and kitchens. To set tile, which generally ranges in size from 1 inch to 12 inches square, tilesetters use cement or "mastic," a very sticky paste. When using cement, tilesetters nail a support of metal mesh to the wall or ceiling to be tiled. They use a trowel to apply a cement mortar—called a "scratch coat"—onto the metal screen and scratch the surface of the soft mortar with a small tool, similar to a rake. After the scratch coat has dried, tilesetters apply another coat of mortar to level the surface and then apply mortar to the back of the tile and place it onto the surface.

To set tile in mastic or a cement adhesive, called "thin set," tilesetters need a flat, solid surface such as drywall, concrete, plaster, or wood. They use a tooth-edged trowel to spread mastic on the surface or apply cement adhesive to the back of the tile and then properly position it.

Because tile varies in color, shape, and size, workers sometimes prearrange tiles on a dry floor according to a specified design. This allows workers to examine the pattern and make changes. In order to cover all exposed areas, including corners and around pipes, tubs, and wash basins, tilesetters cut tiles to fit with a machine saw or a special cutting tool. Once the tile is placed, they gently tap the surface with their trowel handle or a small block of wood to seat the tiles evenly.

When the cement or mastic has set, tilesetters fill the joints with "grout," very fine cement. They then scrape the surface with a rubber-edged device called a "squeegee" to dress the joints and remove excess grout. Before the grout sets, they finish the joints with a damp sponge for a uniform appearance. *Tile finishers* help some tilesetters by supplying and mixing construction materials and doing other tasks such as applying grout and cleaning installed tile.

Floor installers, or *floor layers*, apply blocks, strips, or sheets of shock-absorbing, sound-deadening, or decorative coverings to floors and cabinets using rollers, knives, trowels, sanding machines and other tools. Before installing the floor, floor layers inspect the surface to be covered and, if necessary, correct any imperfections in order to start with a smooth, clean foundation. They measure and cut floor covering materials, such as rubber, linoleum, or cork, and any foundation material, such as felt, according to designated blueprints. Next, they use an adhesive to cement the foundation material to the floor; the foundation helps to deaden sound and prevents the

Carpet installers tape or sew sections together for large rooms.